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March 23, 2002

Christopher E. Mahoney
Primary Examiner AU2851
Art Unit 2851
U.S. Patent and Trademark Office
Box Patent Application
Washington, DC 20231

Re: Response to Office Action Concerning U.S. Patent Application No. 09/589,223

Filed: June 6, 2000
Title: Dual Camera Mount for Stereoscopic Imaging
Docket No.: QUA1844.08A

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Dear Examiner Mahoney:

The following is a response to the Office Action mailed November 23, 2001.

1. Drawings

Applicant is uncertain regarding the Examiner's stated objection. The "non-adjustable mounting" is clearly shown and marked in Fig. 1-3 as item number 12.

2. Specification

The Examiner objects to the disclosure because of "spurious '###' on page 8, lines 16 and 18." Applicant is herewith filing an amendment to rectify this typographical error. The correct reading should be "torsion spring 18".

3. Applicant's Claims Under 35 U.S.C. 112

The Examiner has rejected Claims 3-5 under 35 U.S.C. 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter, specifically the lack of antecedent basis for the "said gears" as recited in Claims 3-5. Applicant is herewith filing an amendment to rectify this objection.

4. Applicant's Claims Under 35 USC 102

The examiner has rejected Applicant's Claim 2 for obviousness under 35 U.S.C. 102(b) in view of the disclosure in Spottiswoode, U. S. Pat. No. 2,891,441. Specifically, the examiner

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points to the language of Spottiswoode that discloses a mechanism to "vary the inter-axial distance between the camera objectives" (Spottiswoode, column 1, line 28-30) by means of moving the cameras "on guides transversely within the camera casing" (Spottiswoode, column 1, lines 64-65). What Spottiswoode discloses is an invention whereby the distance between the cameras is moved by means of a transverse motion across slides, such transverse motion caused by the operation of some spur and helical gears and the one or more lead screw mechanisms. The purpose of this motion is to vary the "inter-axial distance" between the two cameras. Spottiswoode nowhere uses the term or concept of "convergence" and nowhere discloses a method to obtain convergence in the manner described by Applicant.

In contrast, Applicant's invention does not change the "inter-axial distance" between the cameras. Rather, Applicant's invention deals with the "convergence" of the two cameras at a particular focal distance. Applicant teaches a method and apparatus that accomplishes convergence by rotating each camera about a fixed point while the distance between the cameras (more specifically the focal plane in each camera) remains the same (typically about 2.5" which is the average distance between human eyes). This is completely different from Spottiswoode where the distance between the cameras is changed. See Applicants' disclosure Page 5, line 10 through Page 7, line 5, and FIGS. 1, 2, 3 and 6. Thus, Applicant's invention is clearly not obvious in light of Spottiswoode, and therefore, is patentable.

5. Applicant's Claims Under 35 U.S.C. 103

Inaba

The examiner has rejected Applicant's Claim 2 under 35 U.S.C. in light of the teaching of Inaba, U. S. Pat. No. 5,778,268 on the grounds that Inaba "teaches providing two gears ... with a feature on the top surface for mounting a camera. The rotation of each gear is synchronized with the rotation of the other and each gear is able to rotate in either direction." The examiner concedes that Inaba does not teach the use of three gears or that the gears are mounted on separate shafts. However, the examiner alleges that it would have been obvious to make the two gears on separate shafts and to add a third gear. However, the examiner nowhere states how such gears are to be mounted or how the three gears would operate together.

More importantly, the examiner fails to state the basic function of the device described by Inaba. Consequently, the examiner has misunderstood the primary purpose of the gears disclosed by Inaba and confused the purpose of the two gears in Inaba with the purpose of the two primary gears as taught by Applicant. Inaba teaches a method and apparatus whereby the "distance between the optical axes of two photographing lenses" is made adjustable to minimize the effects of "parallax" when making "still" stereo photographic images (see, e.g., Inaba, column 1, lines 1 to 21). The mechanism to adjust the distance between the optical axes is a shaft with two lead screw type gears that can move each camera closer or further apart along an axis between the two cameras. In fact, the method taught in Inaba is very similar (and to Applicant, obvious) to that disclosed in Spottiswoode as discussed above. The only real difference between Inaba and Spottiswoode is that Spottiswoode is designed for moving picture photography while Inaba is designed for still photography. Both move the two cameras closer or further apart along a transverse axis to adjust the optical line of sight.

Applicant's invention teaches a completely different mechanism that is used for a different purpose. Applicant's invention, in contrast to Inaba, does not move the cameras closer or further apart along a transverse axis. Rather, Applicant teaches a method and apparatus for rotating the cameras around two fixed points, typically set at about 2.5" apart which is an average distance for the separation of human eyes. The use of gears in Applicant's device is for controlling the point of focal convergence, which is not the same thing as the parallax in stereoscopic photography as taught by Inaba. Thus, Applicant's invention is clearly not obvious in light of Inaba, and therefore, is patentable.

Lipton

The examiner rejected Applicant's Claim 3 under 35 U.S.C. 103(a) in light of the teaching of Lipton, U. S. Pat. No. 4,418,993 on the grounds that Lipton "teaches providing a non adjustable mounting for one camera C1 and an adjustment mechanism for the other camera C2." Again, the examiner has not stated the principle of operation or purpose of the mechanism disclosed in Lipton (which is "a synchronized shutter ensemble ... and a synchronized stereoscopic zoom lens system), and therefore, has missed the fundamental difference between the teaching of Lipton and that disclosed by Applicant.

First, the gear mechanism disclosed in Lipton is almost identical to that disclosed by Inaba and Spottiswoode in that all three use transverse motion along a single shaft with an acme or lead screw type gear(s) for the purpose of *adjusting the distance between the cameras*. See Lipton figure 1. [Indeed, Applicant is curious how Lipton was granted in light of Spottiswoode and Inaba.] Applicant's invention does not teach a mechanism for adjusting the distance between the cameras along a transverse axis. Rather, it teaches the rotation of two cameras about fixed points spaced apart about the same distance as the average pair of human eyes. Applicant's invention uses a completely different gearing system than any of the cited patents (Spottiswoode, Inaba, or Lipton) and the gears in Applicant's invention have a different function and purpose.

Second, the examiner asserts that: (a) there is no material difference between the mechanisms in Lipton and Applicant's application for adjusting the pitch, yaw and roll of one camera relative to the other camera; (b) Applicant has not shown that the method and apparatus for such adjustment disclosed by Applicant "is for any specific purpose or solves any stated problem"; and (c) that any mechanism for movement of one camera relative to the other "would work equally as well". Consequently, the examiner asserts that Applicant's design was obvious to anyone skilled in the art.

The first thing to note is that the patents cited by examiner range over a period from 1954 to 1998 (about 45 years). This is a very long period and the film and photographic industry has employed tens of thousands of very talented engineers, technicians and artists during this period. There have been hundreds, if not thousands of improvements in the equipment used in the film and photographic industries during this period. Many attempts have been made to make stereoscopic mounts for film and still photography during this period (and for over 50 years prior to 1954). Yet, to date, no one has made a mount that has ever been commercially successful or become the industry standard. None of the mounts for such purposes disclosed in any of the patents cited or referenced by the examiner has ever been shown to be commercially viable, and to Applicant's knowledge, none of them are in commercial use.

There is a very significant difference in the mechanism for planar adjustment (pitch, yaw and roll) disclosed by Applicant and that in Lipton. Lipton's mechanism, consisting of a rubber band and a screw as shown in Fig. 1 and 2, is used on both cameras (see e.g., Lipton page 7, lines 63-64). Thus, both cameras have to be adjusted, unlike that in Applicant's where only one camera is adjustable and only one needs to be adjusted. Lipton admits this on page 7, lines 50-64. Applicant's device uses double plates with a three point screw adjustment that is under constant spring tension. It is a completely different physical design than that of Lipton.

Second, as stated in Lipton on pages 3, lines 45-59; page 7, lines 51-61, each time one of the zoom lenses used on Lipton's device is used, the planar adjustment may have to be repeated. When filming many scenes, this can become a serious burden. The reason that the planar adjustment may have to be repeated many times is due to the design of Lipton which employs rubber bands and screws that have to be tightened to a "lock" position. Thus, it is prone to the movement and vibration commonly experienced during filming. Applicant's device does not use rubber bands and the screws in Applicant's device do not need to be tightened to a "lock" position. Instead, the three screws maintain relatively constant tension by means of a counteracting spring load and do not have a "locking" position. Typical movement and vibration while filming do not cause Applicant's device to change planar adjustment. Planar adjustment with Applicant's invention is typically made only once, at the commencement of filming. The novel design of Applicant's invention makes pitch, yaw and roll adjustment very simple, fast, and only requires one camera (not both) to ever be adjusted.

Next, a careful examination of the drawing in Fig. 1 and 2 of Lipton actually reveals only one dimensional motion, not three dimensional planar motion as described by Applicant. Lipton uses a rubber band (items 43 and 44) and a screw and pivot (items 42 and 45) to move the camera up and down (pitch) under pressure of the rubber band(s) (items 43 and 44) (see Lipton page 7, lines 51-62). Applicant cannot find any other parts or items identified by Lipton in the disclosure for adjusting the plane of the camera in yaw or roll, nor any discussion by Lipton where the method of adjusting yaw or roll is described. A close look at the mechanical device disclosed by Lipton in Fig. 1 and 2 reveals that there is actually no real mechanical mechanism to adjust either camera in any manner except for up and down (pitch). Lipton might argue that the cameras can be moved around inside the rubber band (which will have some flexure) in yaw and roll, but this would be very susceptible to movement and vibration, and moreover, could only take place if the lock down mechanism consisting of items 42 and 45 was loosened. The cameras will naturally tend to move back to the starting position under the tension of the rubber bands (items 43 and 44). This would make the cameras even more susceptible to motion and vibration and essentially unusable. Locking down items 42 and 45 forces the cameras into a single planar position defined by the machined surfaces of the blocks through which item 40 is screwed (not numbered) and the camera mounting plate just above (not numbered). No real yaw or roll is possible. Lipton simply includes the terms pitch, yaw and roll in claim 15 without any antecedent basis in the disclosure. Applicant thus submits that Lipton's claim to any mechanism for adjusting pitch, yaw and roll is without proper foundation and invalid and no bar to Applicant's disclosure and claims.

In summary, there is (a) a very material difference between the mechanisms disclosed by Lipton and Applicant; (b) Applicant has clearly shown that its device is for a specific purpose and solves a stated problem; and (c) the mechanism for pitch, yaw and roll adjustment disclosed by Lipton does not work equally as well as the mechanism disclosed by Applicant (if, indeed,

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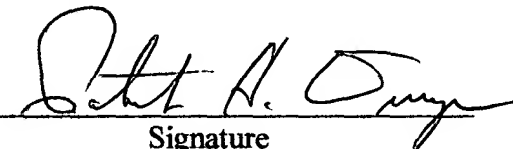
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Lipton's mechanism works at all). Thus, Applicant's invention is clearly not obvious in light of Lipton, and therefore, is patentable.

Barrett

The examiner rejected Applicant's Claim 3 under 35 U.S.C. 103(a) in light of the teaching of Barrett, U. S. Pat. No. 4,768,049 on the grounds that Barrett "teaches the salient features of the claimed invention except for two cameras. It would have been obvious at the time the invention was made for one of ordinary skill in the art to include a second camera for the purpose of simultaneous stereoscopic photography." The examiner has not stated the principle of operation or purpose of the mechanism disclosed in Barrett (which is "a camera slide bar apparatus ... for making of a matched pair of standard 35 mm slides"), and therefore, has missed the fundamental difference between the teaching of Barrett and that disclosed by Applicant. The apparatus taught in Barrett is basically a non-g geared version of the device disclosed in Inaba, Lipton and Spottiswood that is specially designed for still, not film photography. Rather than use gears to adjust the distance between two cameras as disclosed in these patents, Barrett teaches a simple slide bar which allows the user to manually move a single camera between two different positions along a transverse axis by unlocking a set screw and moving the camera manually along a slide bar to the other position, then locking the set screw. There are simply no elements taught by Barrett that are even close to that taught by Applicant.

Again, Applicant's invention is based upon the rotation of two cameras simultaneously and synchronously around two fixed points a set distance apart (typically about 2.5"). This is completely different than moving the spacing between one or more cameras along a fixed axis as described by Barrett and the other cited patents. Thus, Applicant's invention is clearly not obvious in light of Barrett, and therefore, is patentable.


Signature


Print Name & Title

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Date: March 23, 2002

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TITLE OF INVENTION: Dual Camera Mount for Stereo Imaging

Docket No.: AIM1844.08A

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